New drug delivery system to target neural stem cells

Submitted by Laurent Lemaire on Mon, 01/09/2017 - 15:17

Titre	New drug delivery system to target neural stem cells
Type de publication	Communication
Type	Communication avec actes dans un congrès
Année	2016
Langue	Anglais
Date du colloque	12-14/12/2016
Titre du colloque	3rd SFNano Annual Meeting
Auteur	Carradori, Dario [1], Saulnier, Patrick [2], Préat, Véronique [3], des Rieux, Anne [4], Eyer, Joël [5]
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Ville	Paris
Résumé en anglais	in situ differentiation of endogenous neural stem cells (NSC) represents a potential therapeutic strategy to replace injured neuronal cells and to treat neurodegenerative diseases. Nevertheless, no work based on this approach has yet reached the clinical phase. The lack of NSC-targeting molecules primarily promotes the development of non-selective systems with limited effects on NSC differentiation. The aim of our work was to produce a drug delivery system able to selectively target endogenous NSC. The peptide NFL-TBS.40-63 (NFL) shows specific interactions with brain NSC, where it affects their properties and induces their differentiation [1]. Consequently, we produced an NFL-based drug delivery system to target those cells. The peptide was adsorbed on DiD-labeled lipid nanocapsules (LNC, NFL-LNC) and characterized by dynamic light scattering. NFL-LNC targeting efficiency was evaluated on brain and spinal cord NSC. NFL-LNC were incubated with primary NSC cultures, in vitro, and injected either in adult rat's brain or spinal cord, in vivo. The determination of the targeting efficiency was performed by FACS for in vitro experiments, and by immunohistochemistry for in vivo study. Both in vitro and in vivo results show that NFL-LNC targeted brain NSC while they showed no affinity for spinal cord NSC [2]. While we are currently investigating the mechanisms involved in the preferential interactions of NFL-LNC with brain NSC, these data show that NFL-LNC is a promising therapeutic tool to selectively deliver bioactive molecules and to induce in situ NSC differentiation. References [1] Lépinoux-Chambaud, C., Barreau k., & Eyer J. The Neurofilament-Derived Peptide NFLTBS. 40-63 Targets Neural Stem Cells and Affects Their Properties. Stem Cells Transl Med (2016), 5: 901-913. [2] Carradori, D., Saulnier, P., Préat, V., des Rieux, A., & Eyer, J. (2016). NFL-lipid nanocapsules for brain neural stem cell targeting in vitro and in vivo. J. Control. Release, 238: 253-262.
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